DUIT-Distributed Utility Integration Test

Contract #: 500-03-034
Contractor: Distributed Utility Associates
Subcontractors: Pacific Gas and Electric Company: Endecon Engineering
Contract Amount: $2,976,437
Match Amount: $1,890,060
Contractor Project Manager: Susan Horgan (925) 447-0604
Commission Contract Manager: David Michel III (916) 651-9864
Status: Active

Project Description:
The Distributed Utility Integration Test (DUIT) concept in the broader scope defines a large scale set of tests designed to validate newly adopted interconnection standards such as California's Rule 21 and the national Institute of Electrical and Electronics Engineers (IEEE) 1547 standard. The goal of DUIT is to lower the cost of interconnecting distributed generation into the electricity distribution system and ultimately aid in grid support. The testing also goes beyond standards validation and looks at interaction issues which could arise from the interconnection of diverse DER technologies and their interaction with the electrical distribution system from low to high penetration levels. DUIT is unique in that testing at penetration levels up to 60-80% is expected and well above currently contemplated levels of 10%-15%. A complete set of DUIT test protocols addressing twelve segmented topics such anti-islanding, voltage regulation, stability, protective relay coordination, and others will be the focus of work. Each segment is then broken down into ten's to hundred's of tests depending on the topic being addressed.

The two DUIT topics to be covered in this scope of work include voltage regulation and stability. These two segmented topics have been prioritized by protection engineers as major concerns when distributed generation reaches medium to high penetration levels on the distribution system. In the DUIT set of test protocols on these topics, there exists a total of 60 identified tests at this time. These tests are wide in range and scope and consider a wide range of DER such as inverter based DER (prime movers include photovoltaic, batteries, fuel cells, microturbines) together with rotating equipment including synchronous and induction generators.

The entities involved in the development of DUIT test protocols includes the Contractor, the Energy Commission, NREL, DOE, UL, DER equipment manufacturers and a large contingency of utility protection engineers from across the country. The DUIT test protocols developed by this team are identified as addressing areas of most concern as diverse DER continues to populate the distribution system. The development of the test is in parallel with the development of standards including IEEE 1547, California's Rule 21, UL 1741 and others. A significant objective of the DUIT test plan is to provide data which has never before been collected, and will support the development and implementation of these standards.

This project supports the PIER Program objectives:
By allowing easy and safe interconnection of DER to distribution systems, this agreement will:

- Improve the Energy Cost/Value of California's Electricity.
- Improve Reliability, Quality, and sufficiency of California's Electricity.
- Provide greater choices for California Consumers.

Proposed Outcomes:

1. Procure additional DER devices, recruit team members and build consensus on testing needs.
2. Develop the next phase of the testing plan.
3. Update the test management control and data acquisition system.
4. Undertake all pre-installation and facility preparation engineering for the upgrade to a 7 megavolt-ampere (MVA) distribution system.
5. Install and setup of new DER devices for testing.
6. Develop and validate models as testing is being performed.
7. Conduct the prioritized DER tests described in the Test Plan.
8. Disseminate the results of the testing results to assist in utility adoption of DR.

Project Status:

The project is active and is on schedule to begin work in the summer of 2005.